

CROP TALK

Volume 13, Issue 3 OMAF and MRA Field Crop Specialists — Your Crop Info Source September, 2013

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Using Fungicide-Only Treated Seed and Following IPM

Tracey Baute, Field Crop Entomologist – Program Lead, OMAF and MRA

Ontario has experienced significant honey bee kill incidences during corn and soybean planting during the past two years. Based on the analysis conducted by PMRA the neonicotinoid (i.e. Poncho, Cruiser) seed treatments are the likely cause. To try to mitigate the risk of these incidences, best management practices (BMPs) have been implemented. As we learn more about the issue, the BMPs will be strengthened with further steps to help reduce the risk. Information on the current BMPs can be found at www.omafra.gov.on.ca/english/crops/facts/reduce-risk-pollinators.htm

There are many components of the BMPs for reducing the risk to bees at planting. One important component is to go back to following Integrated Pest Management (IPM) and make a choice to use non-insecticide treated seed in fields that don't have a history of pest issues. Fewer fields planted with neonicotinoid seed treatments helps reduce the chance of bees coming into contact with contaminated planter dust. We have seen the use of neonicotinoid seed treatment evolve from being used on those acres that needed it for specific pest problems, to being used on nearly 100% of corn acres and 65% of soybean acres in Ontario. Not all of those acres have pest problems. Because of the risk to pollinators, some growers are considering ordering non-insecticide treated (fungicide-only) seed. Others are uncertain because they are not sure what their pest risks really are. Based on my experience, only 10 to 20% of the corn and soybean acres are actually at risk of most of the soil pests on the product labels. But where are those acres and who are most at risk?

The key soil / early-season pests that the neonicotinoid

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seed treatments protect corn and soybeans from include seed corn maggot, wireworms, grubs (chafer, June beetle), black cutworm, corn flea beetle, corn rootworm, bean leaf beetle and soybean aphids. Some fields are more at risk than others. So what are these risk factors?

High Risk Factors

1. Soil Type
Heavy clay soils are prone to **corn rootworm** infestations, but crop rotation and using rootworm Bt corn hybrids are more effective control options that should be considered. Fields with **sandy soil** are most likely to have **grub** or **wireworm** issues. If you look at a soil map of Ontario, the sandy soil areas very closely match our grub and wireworm hot spot areas. Wireworm and grubs can be scouted for in the early fall, since they are the same larvae that overwinter and feed on the crop in the spring. Digging in sandy knolls or in problem areas where crop emergence has been a concern can help determine their presence. Bait traps can also be used to monitor for activity. For information on how to scout for grubs and wireworms, refer to http://www.omafra.gov.on.ca/english/crops/pub811/13general.htm#soilpests.

2. Crop Rotation
Fields following **alfalfa, sod or other grassy crops** (corn, wheat, etc) are prone to **wireworms and grub** infestations. **Corn following corn** is prone to **corn rootworm** infestations.

3. Field / Pest History
Some growers know they have a pest issue. Most growers who have grubs, know they do because even the neonicotinoid seed treatments can't protect the crop as well in heavy infestation years. Gaps in the stand are still noticeable in these situations. Growers with wireworms tend to experience this too. Early season bean leaf beetle infestations tend to be more prevalent in the 5 most southern counties of Ontario, especially those planted early and those neighbouring alfalfa fields.

Time of Planting Relative to Neighbouring Fields – The **earliest fields** to emerge in any given area are most attractive to **bean leaf beetles** (soys), **black cutworm** (corn) and **corn flea beetles** (seed corn). The **latest planted corn** fields from the previous year are likely to have higher **corn rootworm** infestations in corn the next year.

4. Mild Winters
The **milder the winter**, the easier it is for the beetle pests in particular to overwinter. They overwinter at the soil surface under crop debris and leaf litter. Springs following mild winters are at high risk of **bean leaf beetle** and **corn flea beetles** infestations.

5. Cool, Wet Springs/No Till Fields
Cool, wet soil conditions in the spring leads to poor crop emergence, which gives the soil insect pests in particular the upper hand. **Wireworm and grub** feeding can be prolonged, keeping the crop from growing ahead of the root feeding injury. Fields are more prone to **seed corn maggot** in cool, wet springs when the seed sits in the soil longer than usual. The risk is greater in **no-till fields, deep planting situations,** fields with **recently applied manure or incorporated green manure**. Seed corn maggot is really only a pest of soybeans, and is rarely a pest in corn in Ontario.

6. Weed Management/Cover Crops
Fields with **annual weeds** present in late winter / early spring (ie. chickweed) or **cover crops** are most attractive to **black cutworm** moths that will lay their eggs on this green vegetation. Fields with **poor grass control** harbour **wireworm and grub** infestations.

Soybean Aphids
Most of the soybean acreage is at risk of soybean aphids, but the majority are at risk every other year. Fields next to buckthorn and early planted fields are most at risk of early infestations, but any field can be infested later in the .season. Soybean aphids are not actually controlled by the seed treatments when it counts the most, during the R1 to R5 stages of soybeans when yield is at risk. At best, the seed treatments are keeping early season infestations from starting up early. Experience has shown that Ontario's soybean aphid infestations really don't start to get out of control until around R3 or later, and it doesn't matter then if the field was treated with Cruiser or not. The 2013 season is a great example of that. The exception might be Eastern Ontario, where they do see early season infestations and threshold tends to be reached very close to early flowering (R1). In this scenario, fields treated with Cruiser tend not to need control until a few weeks later. But the Cruiser doesn't necessarily stop a spray from happening. Regardless, a foliar insecticide spray at threshold is still the only method of controlling soybean aphids during the growth stages R1 to R5.

Alternate Control Methods
There are other insecticide options for some of these pests. For corn, granular units can be installed on corn planters, and Force 3G (tefluthrin) can be used in-furrow for wireworm, rootworm and seed corn maggot. There is a cost to adding the units to the newer planters, but over a 10 year life span of a planter, it works out to about $2 per acre cost. Force 3G is currently not registered for use on grubs, though research has shown to work on European chafer. Unfortunately, there currently are no soil applied insecticide options for soybeans.

Black cutworm, bean leaf beetle, soybean aphids and corn flea beetles can be controlled by foliar insecticides, if timed correctly. Scouting for these early and spraying at threshold is very important.

Food Grade Soybeans & Seed Corn
Where I am particularly concerned is for our higher value corn and soybean crops, such as food grade soybeans and seed corn production. These crops cannot afford to be infected with viruses. Foliar insecticides tend not to

adequately reduce the transmission of these viruses like the neonicotinoid seed treatments have. Bean leaf beetles can vector bean pod mottle virus to soybeans, impacting yield, quality and export opportunities. Corn flea beetles vector Stewart's wilt, which some parent lines of seed corn are susceptible to. This disease is quarantined in over 100 countries, so it can have a serious risk to seed exportation. In these crops, I still see significant value in the neonicotinoid seed treatments.

Bottom Line
I recognize the ease that insecticide seed treatments have provided, but they are insecticides and should be used for that purpose. Growers not fitting into the high risk factors may not need insecticide seed treatment, and should consider trying fungicide-only seed next year. If in doubt, plant test strips on your field to learn which fields do need protection and which do not.

Winter Wheat – Ramping It Up!!!

by Peter Johnson, Cereals Specialist, OMAF & MRA

Ontario Wheat Performance Trials First To Include Fungicides In Evaluation
Years ago, no one sprayed wheat with a fungicide, and even rarely with a herbicide. Today, if you don't spray a fusarium fungicide on your wheat crop, you aren't a real wheat farmer. The fusarium issues this year have really driven this point home.

Performance trials are meant to "mirror" the management practices of growers. In 2010, the Ontario Cereal Crop Committee (OCCC) realized that the cereal performance trials needed to address this issue. We began including "managed" trials (fungicides applied) with our normal unsprayed trials to determine if this changed the rankings of the varieties.

While the relative rankings did not change much, in some cases it made a significant impact. In 2013, it was decided to continue these trials with financial support from the Grain Farmers of Ontario, Cribit Seeds, Szentimery Seeds, Bayer, Syngenta, and BASF. For the first time in Ontario, and as far as I am aware the first time in North America, both managed and unmanaged data is available! This is a HUGE win for producers.

Go to the OCCC website, www.gocereals.ca and look at the "Variety Trials". Table 1A, 2A and 3A show the relative yields of both managed and unsprayed trials. Check it out, and pick the best variety for the management options you apply.

Picking Top Wheat Genetics
By now you have probably looked at the wheat variety trials (www.gocereals.ca). Many growers anxiously await the data from Area I or Area II, as that is where their farm is. WRONG! Each year we generate biplots to determine if varieties rank the same from site to site within an area. ALMOST NEVER do the individual sites from Area I and Area II match up uniformly into those geographic areas. In 2013, everything matched up nearly perfectly for all sites, with the exception of Ottawa (Area III), Palmerston (Area II) and Woodslee (Area I). Palmerston and Ottawa paired with each other. Woodslee was off all by itself, with variety rankings essentially unrelated to all the other sites. Go figure!

What chart should you look at then? Use the Area I / II combined data (Table 1 at www.gocereals.ca). Area III really is different, as winterkill and icing are much greater problems at these eastern Ontario locations. However, for the rest of the province, the more data you have to look at, the more likely you will pick a winning variety year in and year out. It is called "wide area adaptability".

We go to a lot of effort to generate this information. You might as well use it the best you can, and in that way, you will PICK TOP GENETICS!

Death To Fall Nitrogen On Wheat!
Every fall I fight this battle. Some agronomist somewhere will get the bright idea that fall nitrogen (N) can increase wheat yields. In some other jurisdictions, fall nitrogen is a standard recommendation. Well, maybe for them, but in Ontario, IT JUST ISN"T SO!

Beginning in the fall of 2009, we conducted trials to investigate if fall N could have a yield benefit. I'm all about yield, so if this was something that would work, I'm on it. After 4 years of replicated research trials on more than 20 sites, we are moving on. It simply doesn't work. Refer to www.ontariosoilcrop.org/docs/v9crpadv_cer1-2012_winter_wheat_nitrogen_response_interim_report.pdf

Never once in those 20+ trials did a fall N application followed by a spring N application yield more than the same amount of nitrogen applied only in the spring. The best we could achieve was an equal yield, but usually it yielded less. Generally, an estimated 50% of the fall-applied N was lost, and the other 50% was available for the crop in the spring.

This is wrong on many fronts. Fall N means another trip across the field. Fall N that is not utilized by the crop means more nitrogen has the potential to become an environmental problem. And fall N that does not increase yield makes me lose money. Bottom line - DON'T DO IT!

Fall Weed Control In Wheat
During the spring and summer of 2013, I took a straw survey of how many growers sprayed their fields getting planted into wheat with a burndown herbicide, or with some fall herbicide once the wheat emerged. I was SHOCKED! Less than 5% of growers utilize this weed control opportunity. It should be 95%, not 5%!!!!! So here is a list of reasons, and options.

- **Better Weed Control**

Control of winter annuals and perennials is far better in the fall than in the spring. The weeds are translocating to the roots, where the herbicide needs to go, rather than to new growth. Control of things like dandelion, perennial sowthistle, stinkweed, and many more are all much better with fall applications. And it is so nice not to have

yellow wheat fields in the spring!

- **Control of Resistant Fleabane**

Roundup resistant Canada fleabane is spreading rapidly throughout the province. Most fleabane germinates in the fall, or very early spring. Inclusion of products like Eragon or dicamba in the fall will give much better fleabane control. Eragon even gives residual control into the spring.

- **Chickweed Control**

Many growers on sandy soil fight chickweed every time they grow wheat. Trouble is, chickweed almost grows under the snow, it is that cold tolerant. By the time you can spray it in the spring, it is already flowering, and often has set seed. The damage is done. Again, most chickweed germinates in the fall. Fall glyphosate helps. Fall Eragon or Refine Extra give 90% + control, even providing some residual into the spring.

- **Red Clover**

With heavy, early weed pressure in the spring from dandelion or chickweed, red clover is often out of the picture. We have no herbicide that will kill the weed in the spring without killing the clover. With most fall applied herbicides, the clover can be applied in the spring without injury. This provides a clean field, and clover for soil structure and nitrogen for my next corn crop.

- **Options Galore**

There are more options than you may think for fall herbicides. Glyphosate and Eragon must be applied before the wheat emerges, of course. But Refine Extra products, bromoxynil / MCPA products, and Infinity are all registered for fall use. Depending on which weeds you have, there is almost always a fall option, whether the wheat has emerged or not. (OMAFRA Publication 75, Guide To Weed Control www.omafra.gov.on.ca/english crops/pub75/chapter8.htm)

NO 2,4-D!

The one caveat to fall weed control - stay away from 2,4-D. Fall 2,4-D can actually impact heading and pollination of the wheat crop the next spring. Weird. But real. No fall 2,4-D!

Whatever the herbicide, do the right thing. If you can at all, spray in the fall!

Using Pre-Harvest Herbicides in Soybeans

By Mike Cowbrough, Weed Management Field Crops Program Lead & Horst Bohner, Soybean Specialist

When poor herbicide performance or late seed germination results in unacceptable amounts of weeds in a soybean crop, a pre-harvest herbicide treatment will aid in a quicker, more efficient harvest. Drier plant matter will pass more easily through the combine and will result in lower seed losses and reduced seed staining. Appropriate product selection for the target weed species and application timing are important for the success of any pre-harvest desiccant.

Pre-harvest herbicides do not speed up maturity, nor make soybean seed dry down faster, they only serve to drop remaining leaves and dry out green material. They will kill green tissue such as leaves, stems, or pods on soybeans but will not help speed up maturity or dry down green seed. Crop quality can be increased because the harvest timing after the field has been sprayed is more predictable, and therefore harvest schedules can be better managed.

What are the target weed species?

If perennial weeds are the target, glyphosate is the preferred product because the shorter days and cooler temperatures that occur in the fall act as a trigger for perennial weeds to reallocate sugars to their roots for over -winter storage. Applying glyphosate in the fall promotes movement of the active ingredient down to the roots, providing more effective control of Canada thistle, perennial sow thistle, field Bindweed and dandelion.

If annual weeds are the target glyphosate will still be effective, but the speed of activity is slow compared to the other pre-harvest options of Aim (carfentrazone), Eragon (saflufenacil) and Reglone (diquat). Therefore glyphosate is often tank-mixed to provide broad-spectrum activity but with increased speed of activity on broadleaf weeds in particular. It is generally not recommended to mix one of the fast acting pre-harvest options with glyphosate if perennial weeds are the primary target. This is because their ability to quickly burn leaf tissue can sometimes impede translocation of glyphosate within a perennial plant.

Application Timing

Application timing is critical. Do not spray too early. If application occurs too early yield losses can occur and chemical residues may be taken into the seed. Herbicide residues in the harvested seed will result in marketing problems. If large patches of soybeans in the field remain green it will be necessary to wait for those areas to mature before spraying. It is safe to spray when seed fill is

***Figure 1** – Beans have separated from pod*

complete. This can be determined by a colour change of the seed from green to yellow. The occurrence of yellow pods is an excellent indicator that the seed has also changed colour. Since the colour change of the pods is gradual it may be difficult to determine when the pods have truly "changed" from green to yellow or brown. A change in colour is defined by the absence of any green colour. Another way to assess if the field is ready is to determine if the seed has separated from the pod. Once the seeds turn yellow, the next visual change is that the seeds start to shrink inside the pod and separates from the white membrane inside the pod. This indicates that the seed is at full maturity. This test is most accurately done by collecting random pods from the top one third of the plant. If all the seed has separated from the pod than the crop has reached physiological maturity and can be sprayed.

The following products can be used for pre-harvest applications in soybeans. Use products based on the label rates and with the recommended water volumes.

IMPORTANT NOTE: If you are harvesting food grade soybeans (e.g. non-GMO) for the export market, there may be restrictions on what pre-harvest herbicides you can use. Contact your buyer to verify what pre-harvest products are acceptable to use.

1. AIM EC at 47 mL/ac + non-ionic surfactant at 0.25% v/v
- The pre-harvest interval for this product is 3 days.

2. REGLONE at 0.68 L/ac + AGRAL 90 at 0.1% v/v
- Apply within 7 days of variety maturity and harvest 5-7 days after application.3. GLYPHOSATE at 0.67 L/ac (540 g/L)) to 1 L/ac (360 g/L)
- Apply when the crop is 30% grain moisture or less.
- Do not apply to crops being grown for seed, as glyphosate can negatively affect seed germination.
- Apply at least 7 days prior to harvest.

4. ERAGON at 28.5 g/ac + Merge at 0.5% v/v
- Apply when stems are green to brown in colour and pods are mature (yellow-brown) and 80-90% of the original leaves have dropped.
- The pre-harvest interval for this product is 3 days.

[* glyphosate rate per acre is based on a product concentration of 360 g/L (e.g. Roundup Original)
1 NIS = Non ionic surfactant (numerous products/trade names are available)]

Comparative studies in Ontario

There is limited public research comparing performance of pre-harvest treatments on different weed species. Dr. Peter Sikkema has conducted four trials from 2010 to 2011 on edible beans and his results are summarized below. Regardless of treatment used, the expectation should be that the pre-harvest treatment will improve harvest efficiency but it will not result in a complete "dry down" of target weeds.

Source: Dr. P. Sikkema, 4 Trials: DB10D1A, DB10D1B, DB11D1A and DB11D1B. Weed Control Trials Research Report, 2010- & 2011. University of Guelph, Ridgetown Campus.

Table 1 – Visual Control of lamb's-quarters, ragweed, pigweed and foxtail 8 days after application of various

	Vison Control (%) 8 days after application			
Treatment (rate/ac)	Lambsquarter	Ragweed	Pigweed	Foxtail
Glyphosate (1L/ac)	32	20	38	62
Reglone (0.92L/av) + Agral 90 (0.1% v/v)	74	80	78	48
Glyphosate (1L/ac)*+Aim EC (47mL/ac)+NIS [1] (0.25% v.v)	39	25	50	64
Glyphosate (1L/ac) *+Eragon (28.5g/ac)+Merge (0.5% v.v)	49	72	66	65
Glyphosate (1L/ac) *+Reglone (0.92L/ac)+Agral 90 (0.1% v.v)	70	77	76	49

Double Cropping Fall Rye For Extra Forage

by Joel Bagg, Forage Specialist, &
Peter Johnson, Cereals Specialist, OMAF and MRA

Fall rye is an excellent forage crop when seeded after early-fall harvested crops. It is ready for harvest in southern Ontario in mid-May, which provides great opportunities for "double crop" options, yet can fill in the gap in years when forage supplies are short. Seed as early as possible in September, apply nitrogen in the spring, and time harvest for nutrient quality needs. Do not confuse cereal rye (*Secale cereale*) with ryegrass (*Lolium multiflorum or L. perenne*), as they are totally different grass species with quite different characteristics.

Fall rye prevents erosion and gives good weed suppression. Rye is very cold tolerant, the hardiest and most disease resistant of the winter cereals. Fall rye has an extensive fibrous root system, can scavenge nitrogen very effectively, and utilizes early spring moisture for rapid growth. Fall rye is faster growing and earlier maturing in the spring than the other winter cereals, including wheat, barley and triticale. This enables an earlier forage harvest and more "double crop" options.

Fall rye grows well on lighter and low pH soils, but does not do well on poorly drained, heavier soils. Forage rye is higher yielding, but not as palatable as winter wheat. Rye matures rapidly at the flag-leaf, boot and early-heading stages, with significant reductions in forage quality. This can create the challenge of a very narrow harvest window, particularly if there are rain delays.

Double Crop Options
Farmers looking for extra forage can plant fall rye following the harvest of many crops, particularly corn silage. Forage rye harvested in mid-May can be followed by a late-planted crop, such as soybeans, edible beans, or a warm-season annual forage crop such as sorghum. Winter wheat heads two weeks later than fall rye making forage wheat harvest too late to be followed by corn or soybeans. In dry years, decreased moisture in the soil profile following forage rye can have a negative effect on the yield of the following crop. It is essential to completely kill the rye with glyphosate or tillage to minimize shading and competition for moisture.

Rye is sometimes noted for having an "alleopathic effect" that suppresses the germination and growth of weeds and other crops. With most of the rye plant removed, alleopathy is a low risk in forage situations. The possible exception is with no-till corn on heavier soil types.

Seeding
Fall rye is easy to establish and can be seeded from late-summer to late-fall. If harvest as silage the following May is planned, fall rye should be seeded in September, but later seedings can work. Early planting allows more time for tillering, higher forage yields, and slightly earlier forage harvest dates. Some growth going into winter is preferred for early spring growth and good yields. Seed is relatively inexpensive. Under good conditions, fall rye can be seeded at 110 kg/ha (100 lbs/ac), but the seeding rate can be increased up to 190 kg/ha (168 lbs/ac, 3 bu/ac) if the seed is broadcast rather than drilled, or if the seeding date is late.

Grazing
Fall rye is best used to provide early-spring grazing, but can also be grazed into late-fall. It is ready to graze early in the spring and growth is very rapid. To ensure that it does not get too mature, be prepared to move livestock frequently by strip grazing. Grazing rye on wet heavy clay soils in late-fall or early-spring is not recommended due to livestock "pugging" and compaction. If fall pasture is desired, fall rye should be seeded by August 15-30th.

Haylage
Fall rye can be made into good stored feed as either silage or baleage. Fall rye cut at the desired stage is extremely difficult to dry sufficiently to be made into dry hay. Nitrogen applied at 55 – 80 kg/ha (50 – 70 lbs/ac) in the spring at green-up will stimulate tillering and increase forage yield.

The timing of cutting is critical. Quality, palatability, and intake drop very quickly at the heading stage (faster than other cereals) so the optimum harvest window is very narrow. It is recommended to target harvesting forage rye at the **flag-leaf** or **early-boot stage** for high nutrient quality. Early-boot generally occurs May 10th - 20th in southern Ontario. At this stage, a dry matter yield of 2 tonnes per acre or more is possible under good conditions.

There can be a very large range in forage quality with only a few days difference in harvest. At the early-boot stage (Zadok Stage 39 - ligule of the last leaf just visible), crude protein (CP) can approach up to 18% (depending on the amount of nitrogen applied), with Neutral Detergent Fibre (NDF) under 50%.

At the head-emerged stage (Zadok Stage 55), CP drops to the 13 - 14% range, while NDF increases to over 60%.

This will likely be adequate for beef cows, heifers, and dry cows, but will not be high producing dairy cow or sheep quality.

When rye is cut later, at the early-dough stage, the yield may approach 3 tonnes per acre, but the quality, palatability and intake will be much lower. Delaying forage rye harvest past the boot stage because of bad weather or competing field crop activities is not very forgiving.

Winter Triticale
Winter triticale, a cross between rye and wheat, has been suggested by Tom Kilcer in New York State as being preferable in both forage yield and quality to either fall rye or winter wheat. His research indicates that winter triticale harvested at the flag-leaf stage (rather than boot-stage) can be very high quality feed for dairy cows. There is limited data evaluating the agronomics and nutrient quality of winter triticale in Ontario, although

research is currently underway. Preliminary Ontario research results suggest that triticale suffers much more from late plantings or adverse fall conditions than rye. Triticale seed is difficult to source and more expensive than rye. Harvest of triticale will be slightly later than rye at the same stage of maturity, which may delay planting of the subsequent crop. While there is good potential for triticale, farmers interested in forage triticale should try rye as well and evaluate them in their own systems.

Summary
Seeding fall rye for forage can be an excellent, cheap source of additional feed. Seed as early as possible in September, apply nitrogen in the spring, and time harvest for nutrient quality needs. By double cropping, rye can fill the gap on years with short forage supplies, or be a regular part of a profitable rotation.

Pasture Records

by Jack Kyle, Grazier Specialist, OMAF and MRA

Keeping pasture records is an important part of good pasture management. With written records, you can see the results of management changes, as well as weather impact on both forage and livestock performance. You will be able to draw a number of comparisons between years that will provide valuable management information.

With a set of records that provide details of what has happened you can accurately compare month-to-month and year-to-year performance. A pocket notebook or a three-ring binder can form the basis for a good system. If you want to expand to a more complex computer spreadsheet at some future date, you can.

What to include
Your records should include:

- Weather data- amount of rainfall, frost dates, and extreme summer temperatures.
- Forage or sward information - species mix in the pasture, additional fertility applied, and pasture growth at different times during the grazing season.
- Livestock information - size, type and number of animals on the pasture, frequency of moves to new paddocks, beginning and ending dates of the grazing season, amount of residual forage and any supplemental feed required.

This is a long list, but the records can be as simple or as complicated as you wish. Table 1 shows an example, with cow calf pairs having made 5 rotations through the pasture over the grazing season. This pasture produced 158 cow days per acre of grazing.

Measuring Available Pasture
There are a number of tools to assist in measuring the amount of forage present. Height and density are the two important components. The use of a grazing stick or a rising plate meter will help in determining the quantity of forage present. There is such a wide variation in the species composition of our Ontario pastures that the accuracy of these measuring devises leaves a lot to be desired.

If you take a close look at the pasture density and height along with current stocking rate, you should be able to estimate the number of animal days per acre that is present. A notebook will provide the basics for the record keeping and over time will give a clear picture of your grazing management. By recording and accumulating this information you will be able to make grazing decisions that will have a positive benefit to your operation.

Your Grazing Wedge
At regular intervals during the grazing season (every two weeks would be optimum) you can estimate the amount of forage available in each paddock and create a graph of your grazing wedge. This graph will show the amount of forage available in your paddocks at that point in time. Graph 1 shows the grazing days of pasture available in each of 12 paddocks. The "grazing wedge" should be a line declining from the paddock about to be entered (Paddock #1) to the paddock that the livestock just left (paddock #12). This wedge graph will indicate if there are problems in one or more paddocks, and allow you to project future forage needs. In this example, we can see that paddocks 9 and 10 are not recovering as fast as would be expected. This graph gives us sufficient warning that there will not be sufficient forage in these 2 paddocks when we come to them in the rotation. Should we slow

Pasture Name	Dates in Paddock	Type of Animals	Number of Animals	Acres	Total Animal Days	Animal Days/Acre & Total
1	May 10-12	Cows & Calves	50	4	100	25-25
1	May 28-30	Cows & Calves	55	4	165	44-69
1	July 1-3	Cows & Calves	55	4	110	27-96
1	Aug 15-18	Cows & Calves	50	4	150	37-133
1	Sept 28-30	Cows & Calves	50	4	100	25-158

Table 1 – Example Pasture Record

the rotation, or find alternative feed source to supplement these 2 paddocks when they come around in the rotation? Using a 3 day rotation it will be 24 days before we get to these paddocks, so there is time to make adjustments.

Each year is different in the grazing business, but with information you will be able to analyze the differences and manage your pastures for maximum returns.

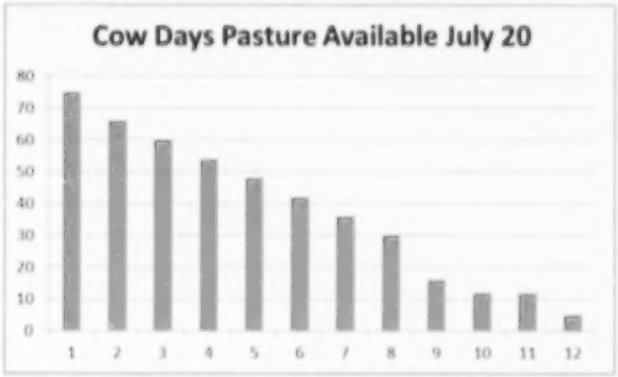

Figure 1 - Grazing Wedge – "Cow Days" of pasture available in each of 12 paddocks.

Cover Crop Opportunities and Management

by Adam Hayes, Soil Management Specialist – Field Crops

Late-Season Cover Crop Options

Haven't had a chance to get a cover crop on after a cereal crop? Harvested corn silage and want some ground cover over the winter? Taken off early edible beans or soybeans? There is still an opportunity to plant cover crops to protect the soil over winter, add organic matter, provide some feed or improve soil structure.

At this time of year, cover crop choice is largely dependent on how much growing season is left before a typical killing frost. If the planned planting date is:

1. More than six weeks before killing frost, then oats, radish, annual ryegrass and a number of similar cover crops can be planted. The growth period is shorter so consider keeping the seed cost down as the benefit will be less than a cover crop planted in August.
2. Less than six weeks before killing frost, then the only options are rye and other winter cereals. These will continue growing into the fall and into the spring if desired. The other cover crops will not produce enough growth to provide a significant benefit.

Don't forget to consider cover crop mixtures, as they can provide more benefits than a single cover crop. Use a drill to plant the seed for faster emergence.

Managing Growth and Termination

Cover crops can provide a lot of benefits, but they can also cause some challenges if they are not managed properly. Some cover crops, especially if they are planted early, can produce a lot of growth which can be welcome if needed for feed. If it was unanticipated it may be difficult to handle for the following crop if it wasn't managed in the fall. Table 1 lists a number of common cover crops and management options for the crop in the fall or following spring.

Cover Crop	Growth Stage	Termination
Oats	1 to 2ft tall (30-60cm)	Will die over winter, leaving a light amount of residue
	Heading	Mowing to manage residue maturity/ breakdown or harvest for feed
Oilseed Radish	Rosette	Dies over winter with several nights of –3C temperatures
	Flowering	Mow to avoid seed set
Clover	Flowering	Requires tillage or herbicide to kill
		Note-if weeds are flowering consider clipping to prevent them from going to seed
Rye/Winter Cereals	Tiller stage, will not head without vernalization	Requires tillage or herbicide to kill

Table 1 - Cover Crop Options

Nitrogen Deficiency In 2013 - Was It Rate, Or Does Source Matter?

by Bonnie Ball, Soil Fertility Specialist, OMAF and MRA

Wet conditions in the spring and early summer of 2013 resulted in nitrogen (N) deficiency in many corn fields (Photo 1). When anhydrous ammonia is knifed between corn rows, the crop is more uniform and the nitrogen is more available under wet conditions (Photo 2).

How Does Nitrogen Get Lost?

Under wet conditions, nitrogen gets lost by 2 processes - denitrification and leaching (Figure 1). It is the nitrate-nitrogen form that gets lost. Therefore, the more nitrate that is present when it rains, the more that gets lost by one process or the other. Which process predominates depends on drainage.

In well-drained soil, leaching predominates. Three inches (80 mm) of rain will leach most of the N that is present as nitrate out of topsoil that is light textured. If roots are present in the subsoil, this nitrate can still be available to the crop. If more rains come, the nitrate moves deeper down the profile and out of reach of the crop.

With poor drainage, denitrification is the dominant loss process. Denitrification is the conversion of nitrate to

Photo 1 - Symptoms of nitrogen deficiency in 2013

nitrogen gas (N_2) or nitrous oxide (N_2O), which escape to the atmosphere (Figure 1). The conversion is done by bacteria and occurs when soil is depleted of oxygen (anaerobic) i.e. in wet holes.

The third way that N gets lost is volatilization, which is the transfer of nitrogen as ammonia gas from soil to the atmosphere. Urea is susceptible to volatilization. The N in urea is attached to carbon atoms. When urea converts to

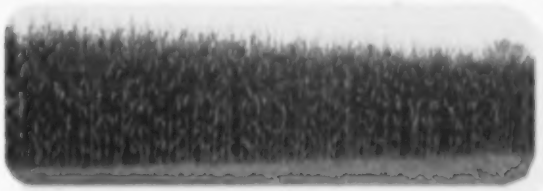

Photo 2 - Corn fertilized with anhydrous ammonia in 2013.

ammonium, the urease enzyme cleaves NH_2 off the C (Figure 1). Up to half of the urea-N can be lost to volatilization if left on the surface. Even banded urea is susceptible to volatilization. Up to one-third of the urea-N can be lost from shallow bands. This occurs because conversion of NH_2 to NH_4 uses up two H^+. This drives up pH causing more of the ammonium to convert to ammonia gas.

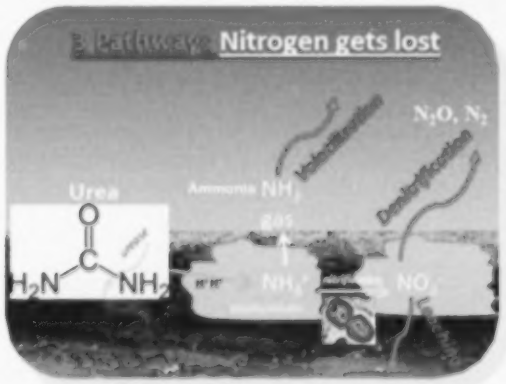

Figure 1 - The main pathways of nitrogen loss – denitrification, leaching, and volatilization

Stopping The N Loss

Losses to both denitrification and leaching can be reduced by minimizing the nitrate pool size (Figure 2). Less of the nitrogen present as nitrate at any one time improves the odds of being able to conserve nitrogen against erratic rains. Inhibiting nitrification is an opportunity to keep the nitrate pool smaller. Nitrification is the conversion of ammonium to nitrate, which is carried out by bacteria. Compounds that inhibit nitrification by slowing these bacteria are dicyandiamide (DCD); 2-chloro-6-[trichloromethyl] pyridine (nitrapyrin); and to a lesser extent, ammonium thiosulphate (ATS) (Franzen).

Losses to volatilization can be reduced by minimizing the ammonium pool size. Inhibiting the urease enzyme is an opportunity to slow the conversion of urea to NH_4–N (Figure 2). A common urease inhibitor is N-butyl thiophosphoric triamide (NBPT). Another way to slow the conversion to NH_4 is polymer coating the urea (environmentally smart nitrogen - ESN). The plastic slows water entry through the granule, thereby slowing the conversion.

Anhydrous ammonia (82-0-0) converts to ammonium when knifed into soil. It inhibits nitrification by temporarily killing bacteria in the knife band. This keeps the N in the ammonium form longer, providing a yield advantage under wet conditions. In a study comparing yield and nitrate movement to groundwater, anhydrous ammonia, UAN (28-0-0), and UAN with a nitrification inhibitor were compared. In a wet year (116 mm of rain in June), in light-textured soil, corn side-dressed with anhydrous ammonia yielded 19 bu/ac greater than that side-dressed with UAN. With the nitrification inhibitor DCD added to the UAN, corn yielded 8 bu/ac more than with the straight UAN. Nitrate-N concentration in soil water below the crop root zone (5 feet deep) was much greater below the straight UAN (40 ppm) than below the UAN+DCD (20 ppm) or the anhydrous (10 ppm). The yield response was primarily due to less leaching where nitrification was inhibited (Ball Coelho, Roy 1999).

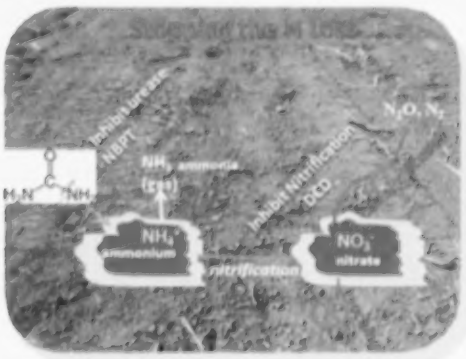

Figure 2 - Shrinking the nitrate pool reduces loss to denitrification and leaching. Shrinking the ammonium pool reduces loss to volatilization.

UAN (urea-ammonium-nitrate) consists of 50% urea-N, 25% ammonium-N, and 25% nitrate-N. Therefore 25% of the N (the nitrate-N) is immediately susceptible to loss by leaching and denitrification at time of application. 50% of the N (the urea-N) is susceptible to volatilization if left on the surface. The remaining 25% (the NH_4-N), will convert quickly to nitrate under warm, moist conditions. Then it is susceptible to denitrification or leaching.

Using stabilized nitrogen or taking the time to place the right source at the right time pays off some years. Sidedressing with anhydrous ammonia conserves nitrogen because application time is matched to crop demand. All of the nitrogen is in ammonium form, and nitrification is slowed by the material itself. The smaller the nitrate pool at any one time, the less N can be lost to denitrification or leaching.

In Furrow Phosphorus For Soybeans - Is It Worth the Expense?

by Horst Bohner, Soybean Specialist, OMAFRA

Soil test values for phosphorus (P) as well as potassium (K) have been declining in Ontario over the last number of years. In some cases, the decline in soil test values is leading to yield limitations. In order to provide soybeans with adequate nutrients, while taking into consideration the real world constraints of fertilizer cost, equipment capabilities, and ease of application, new approaches to fertilizing soybeans are required.

The typical way to apply fertilizer to a soybean crop has been to broadcast and incorporate P and K. This requires extra passes over the field. Many of the air seeders being used today have the ability to apply fertilizer in the seed trench at seeding time. This could potentially save time for growers as well as place the fertilizer into the root zone for quick uptake.

Research Trials & Results

A field study was conducted to determine if adding MAP (11-52-0) in-furrow was economically viable. This included 16 sites over four years, from 2009 to 2012. The sites had a range of soil tests, from low response sites (soil tests greater than 16 ppm P and 120 ppm K) to high response sites. It was determined that applying 50 pounds of MAP fertilizer in-furrow with soybean seed would provide the best chance of producing a positive yield increase, while limiting the amount of fertilizer burn. No K was added in this set of experiments due to the high likelihood of seed burn. Stand counts were taken to assess stand losses due to fertilizer burn on seed. Yields were taken at year end to determine economic returns. Each plot was 20 feet wide by at least 1000 feet long, and was replicated 3 times. Plots were planted with a Kearney 15 inch vacuum planter. Results are summarized in Table 1.

Using 50 pounds of MAP with soybean seed in the furrow appeared to be a reasonably safe practice. The average stand loss was insignificant, with a reduction of about 1,600 plants per acre. The highest stand loss recorded in the study was 38,000 plants, caused by prolonged dry weather after planting.

Average Results of 16 Sites	Treatment		
	Untreated	25lb P In-Furrow	Difference
Stand Côunt (Plants/Acre)	144,008	142,382	-1,626
Yield (bu/ac)	50.9	52.3	1.4

Table 1 - Comparison of soybean yields when MAP added

The average yield increase for adding MAP was 1.4 bushels per acre. Yields ranged from -1.1 bu/ac to 6.2 bu/ac when adding MAP in-furrow. Application costs of MAP at 50 pounds an acre are about $17/acre. An average yield gain of 1.4 bu/ac at a selling price of $12/bu represents a gain of $17/acre. Therefore, the application of 50 lbs/ac of MAP in furrow was a "break even" proposition in this study. However, when soil tests values were low, yield gains were more significant.

Yield gains from added MAP fertilizer did not come only in locations with poor P soil test values. Placing MAP in the furrow also stimulates growth in root mass, which can help nutrient uptake. (Photo 1) This might help to explain why yield gains have been recorded in fields which have higher soil tests.

Photo 1 - Untreated (left) soybeans vs 50lbs of MAP in-furrow (right). Notice the difference in root mass, as well as the advanced stat of plant development for the plant treated with fertilizer.

Summary

Placing MAP fertilizer in-furrow with soybean seed is a reasonably safe practice. However, it must be noted that placing fertilizer with soybean seed can cause seed burn when the weather remains dry after planting, or in sandy soils. Higher rates of MAP with seed should be avoided as the risk for seed burn increases. Some growers have reported lower yields when adding MAP in-furrow. This is likely due to seed burn. This method of fertilizer application can save time and money in operations that have the necessary equipment. This practice is probably best suited for fields with low soil test values, because the yield gains will likely outweigh possible stand reductions. Sandy soils are more prone to fertilizer burn, so no fertilizer should be placed in-furrow in those fields.

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